



An Energy Efficiency Workshop & Exposition

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Kansas City, Missouri

# ***Promoting Energy Efficiency through ESPCs***

USDA

**National Animal Disease Center**

Ames, IA

**Team Members:**

**Sandy Postell - USDA-CO**

**Dennis Jones - USDA-NADC-Facility Engineer**

**Jerry Cook - Johnson Controls**

**James Prince - Johnson Controls**

**John Ziegenbusch - Alliant Energy**

**Steve Dunnivant - Project Facilitator**



## ***Overview of ESPC at NADC***

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- **NADC Background & Unique Features**
- **NADC Project Description & Results**
- **Role of ESCO & Utility Supplier**
- **Experiences and Lessons Learned**
- **Some Do's and Don'ts**

## *National Animal Disease Center*

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Research on diseases of livestock

- Opened in 1961
- 270 ARS Employees

- 450,000 sft in 80 Bldgs on 320 acre site

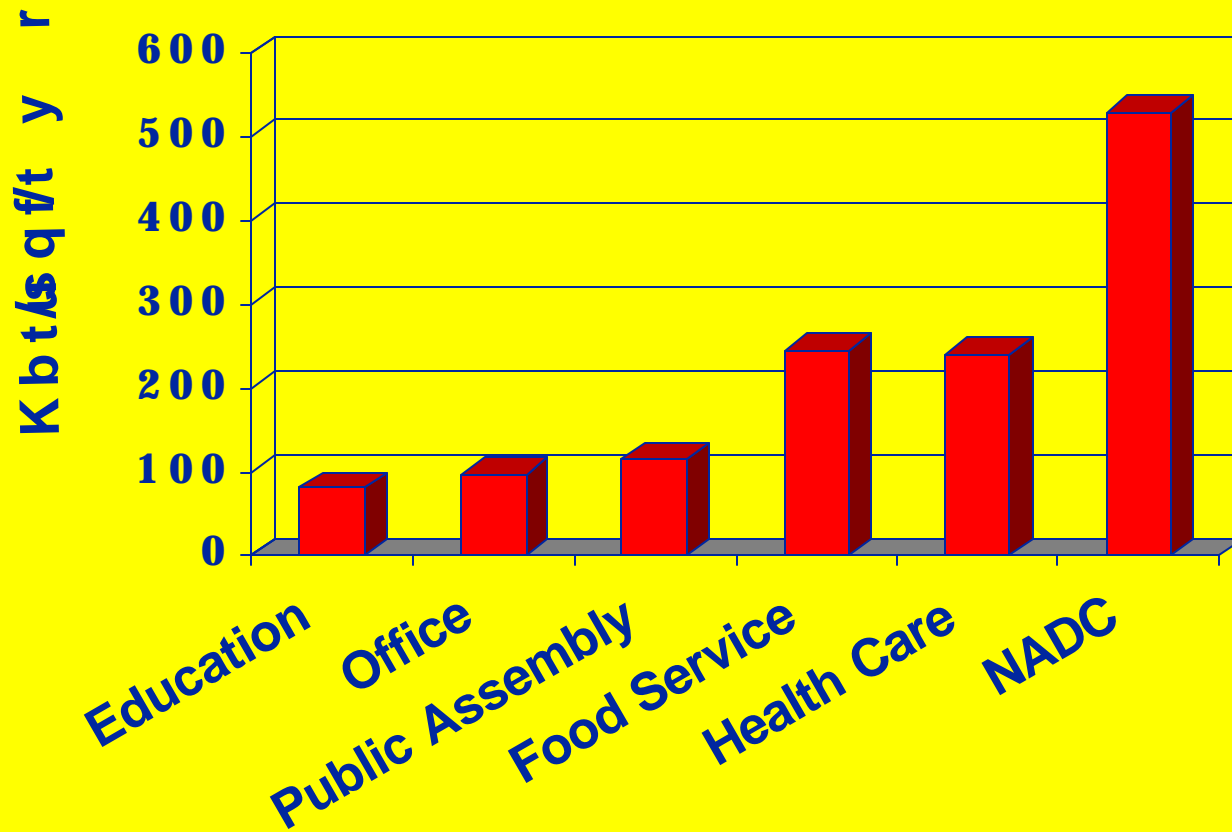
- \$20 mil Annual Budget - \$1.7 mil Utility Bill

## ***NADC Unique Features***

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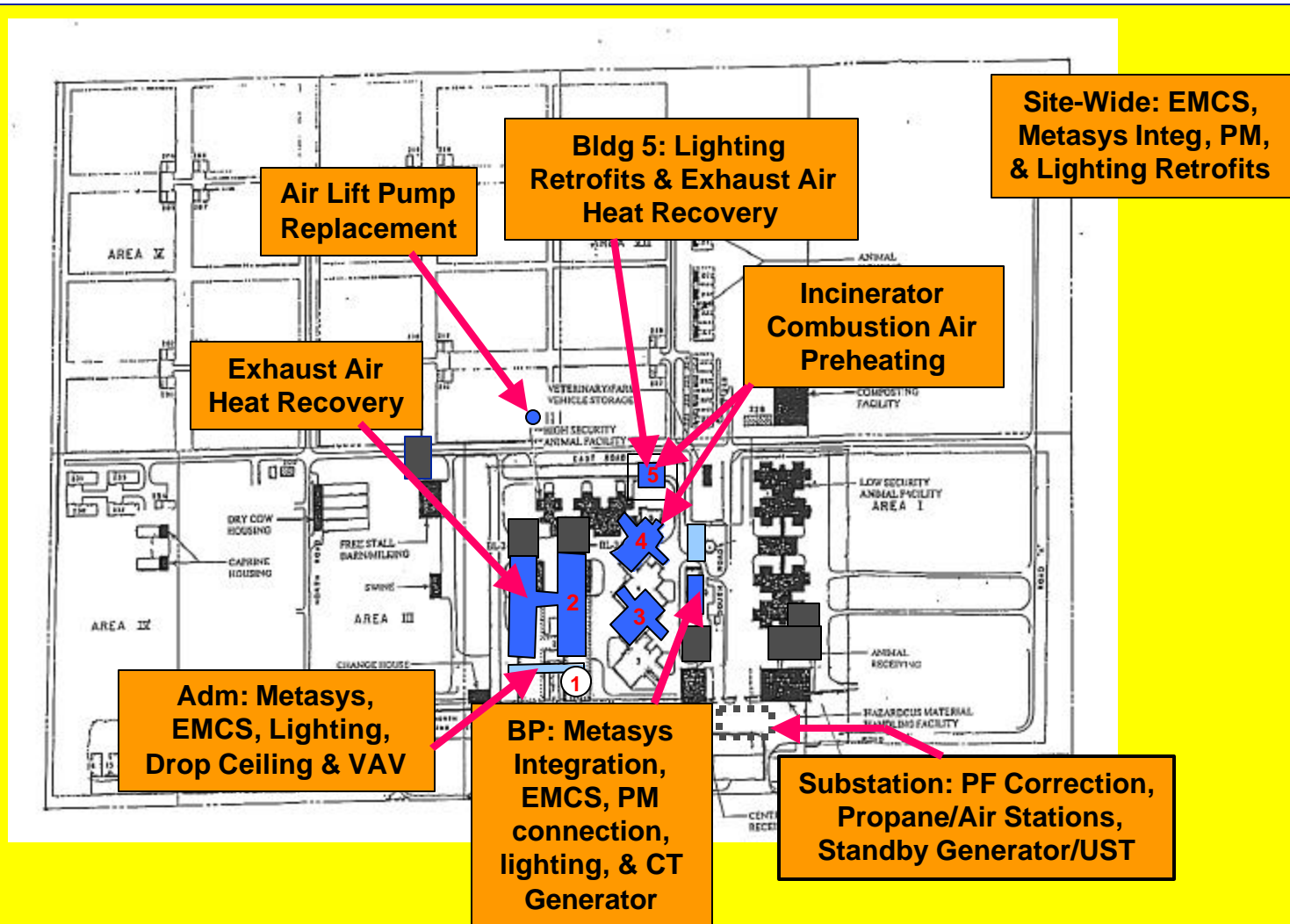
- 100% Fresh Air with HEPA Filtration
- Redundant energy systems for biocontainment & laboratories
- Use of steam sterilizers for solid wastes
- Heat sterilization of wastewater
- Incineration of animal carcasses & biohazard wastes

# *NADC Energy Utilization*





# NADC ESPC Projects





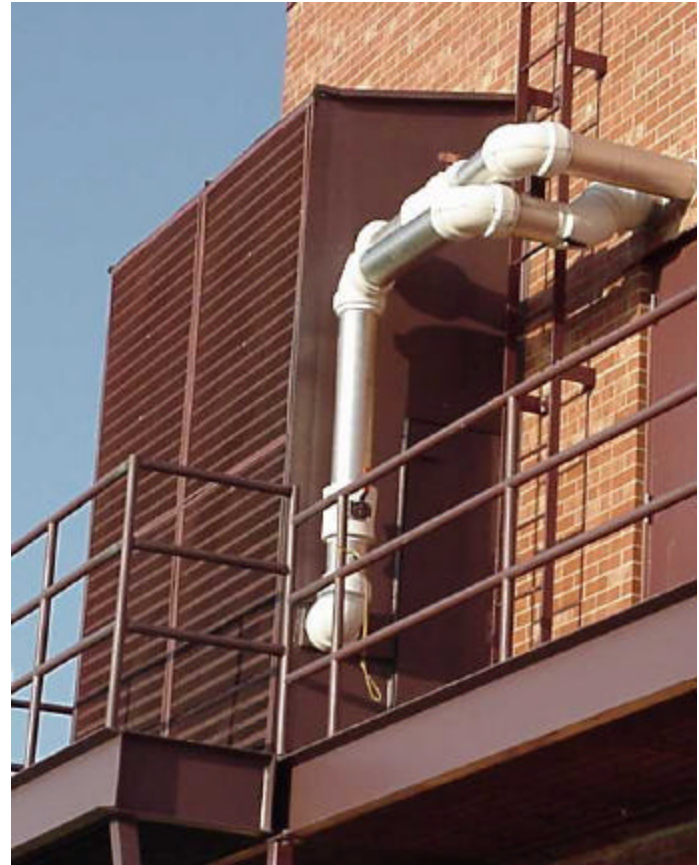
## ***ESPC Status***

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- **Total Contract \$6.4 Million**
- **Guaranteed Annual Savings = \$550,000**
- **Simple Payback = 11.5 years**
- **Contract Term = 17 years**
- **Utility Rebate = \$350k**

# ***Exhaust Air Heat Recovery***

- Coil in exhaust plenum
- Glycol heat transfer fluid
- Preheat coil ahead of coils

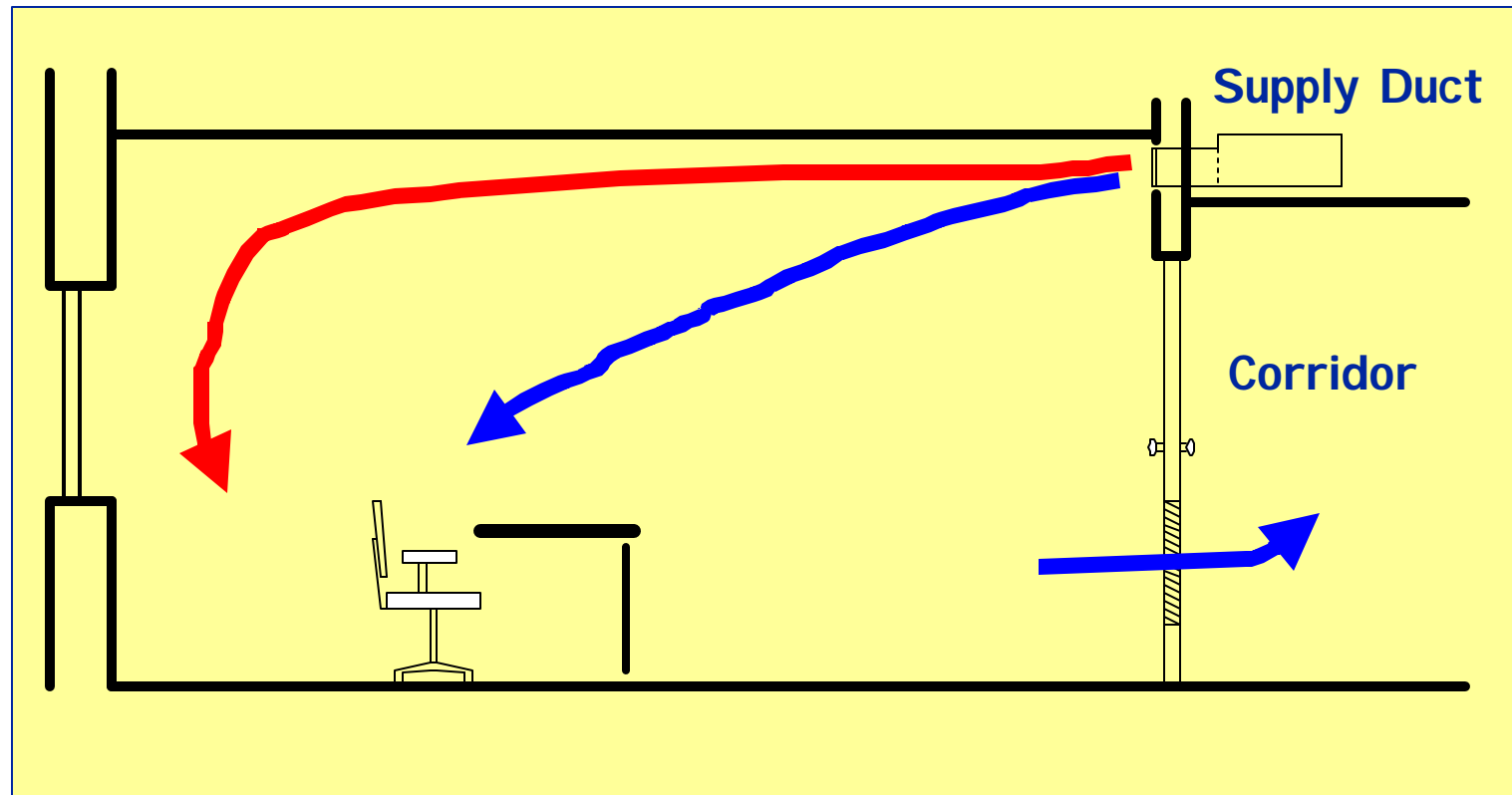


**Building 2**

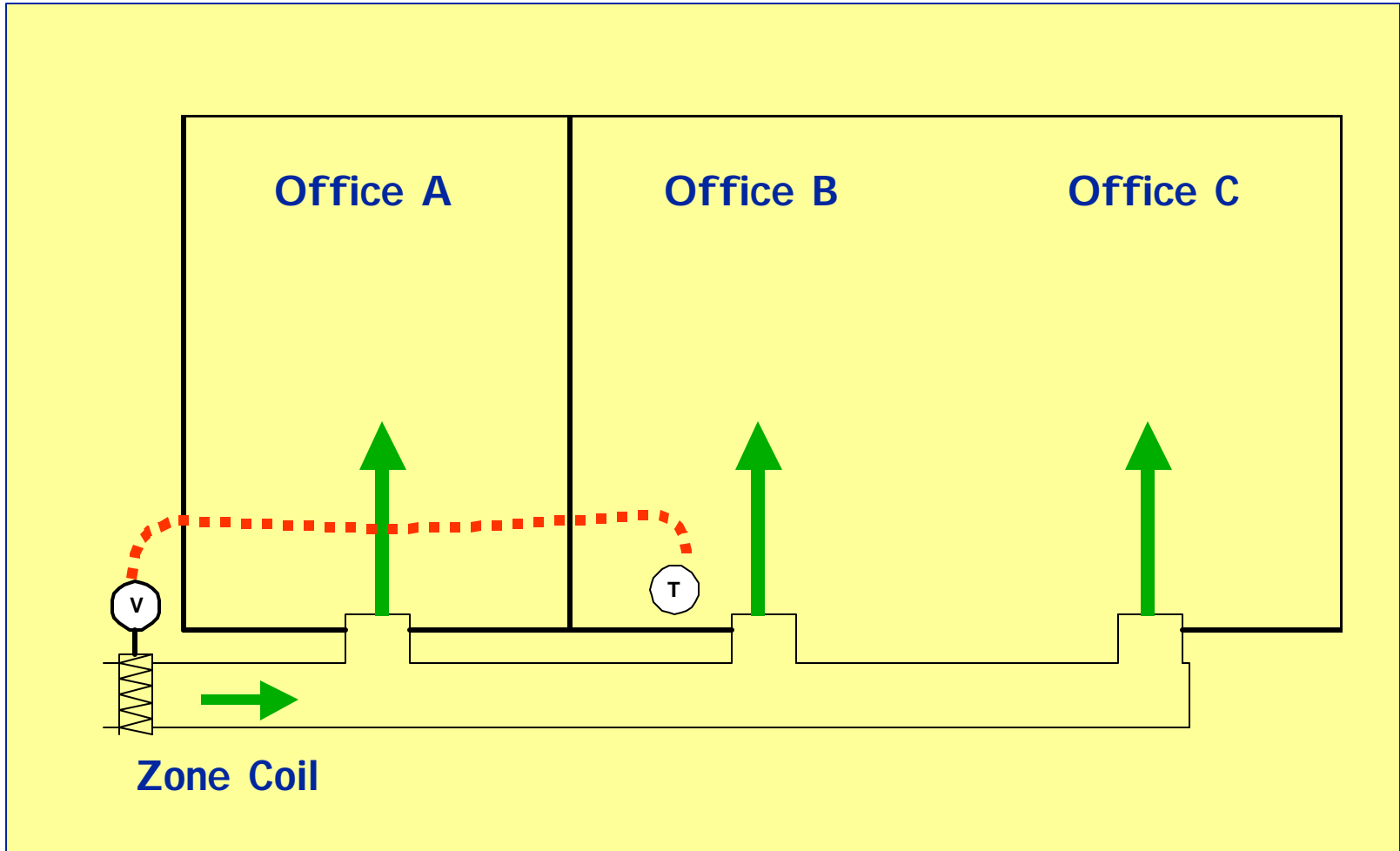
**Building 5**



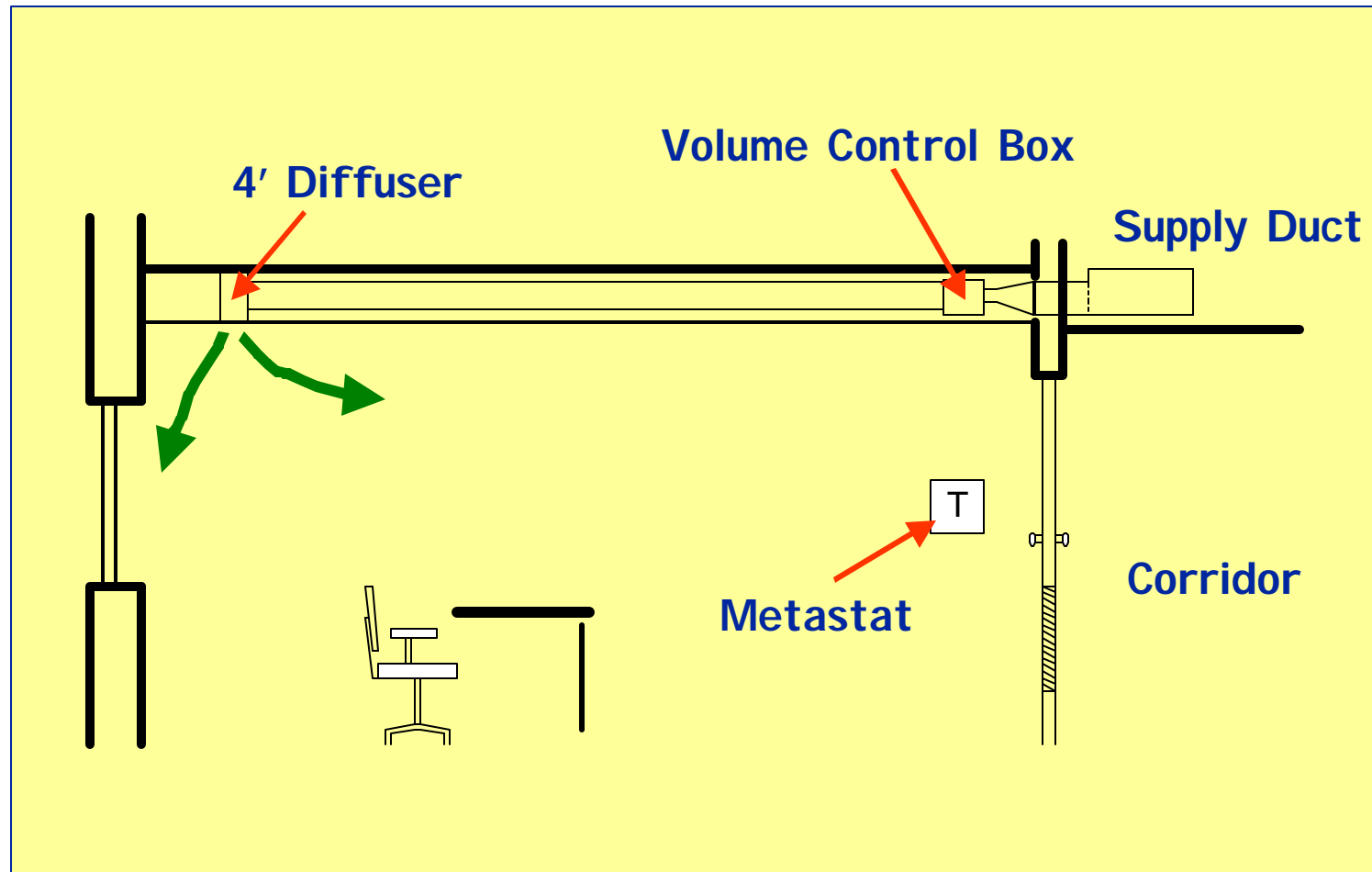
# *Existing Office Air Distribution*



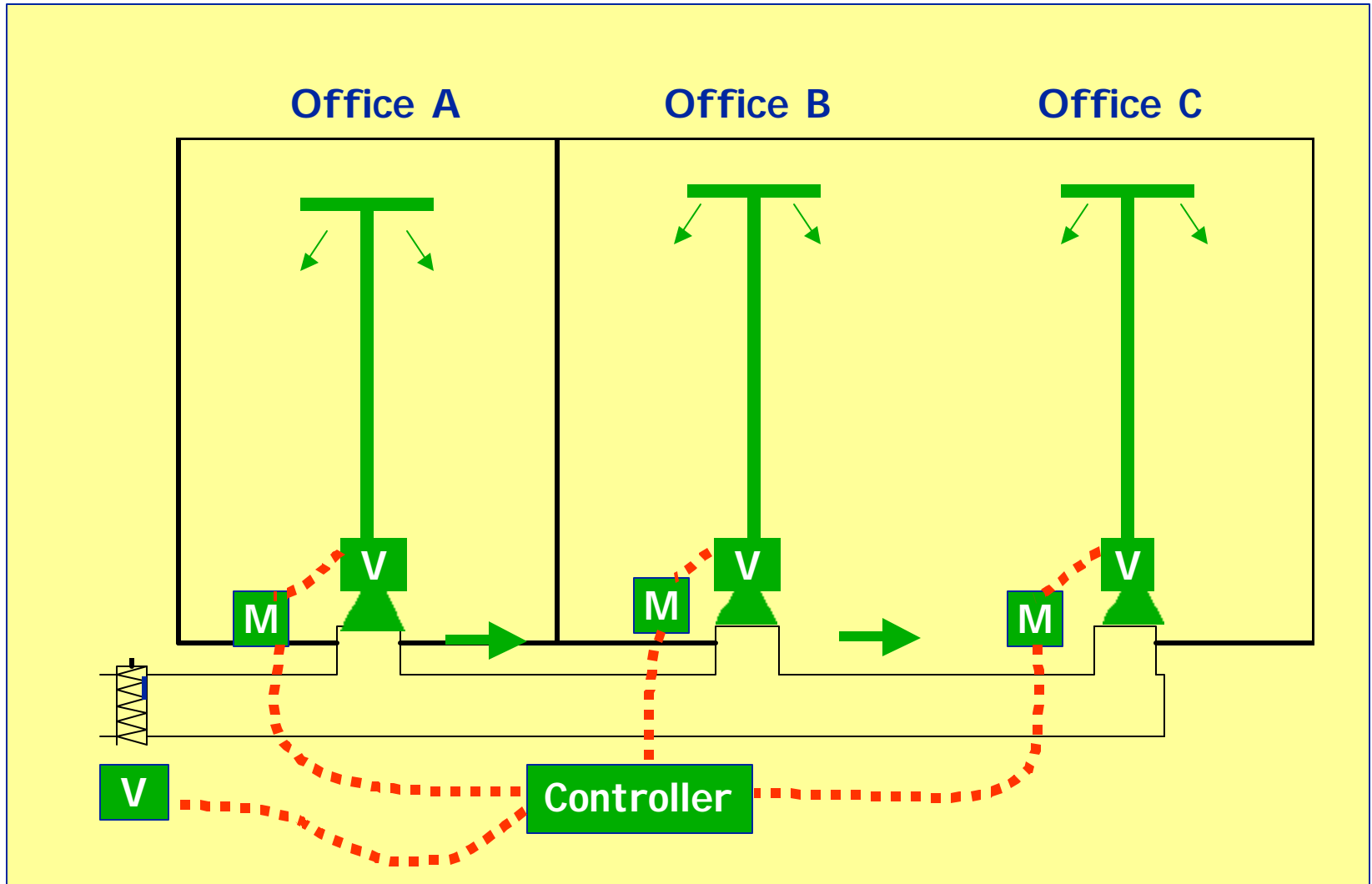
## *Existing Temperature Control*



# ***New Office Air Distribution***

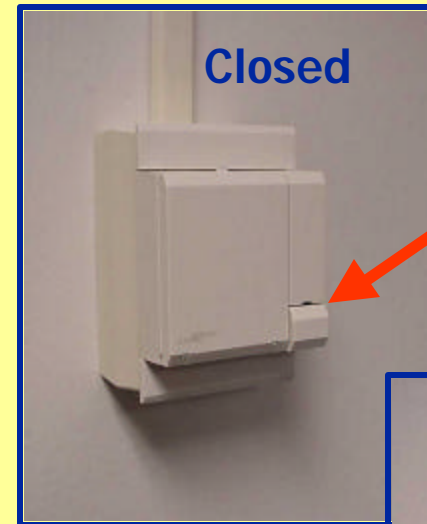


# *New Temperature Control*



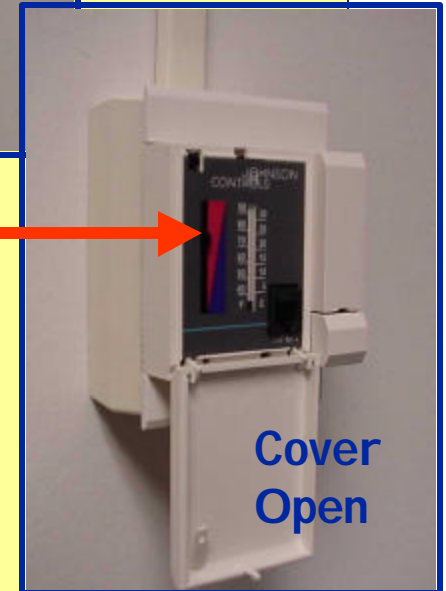
# Digital Thermostats

- One in Each Office/Room
- Thermometer for checking
- Occupant Adjustable  
(Heavy/light clothing)
- Monitored in Control Center  
(Alarm if out of range
  - hopefully before call comes in)
- Occupied/Unoccupied Modes
  - Each room programmed to occupant's schedule
  - Manual override button



Override  
Button

Control  
Slide



Cover  
Open



## ***Co-Generation ECM***



- Replace 40yr old boiler**
- Heat Recovery Boiler**
- 8,000 #/hr + ductfire**



- 1.1 MW Combustion Turbine**
- Dual fuel capability**
- Base load design**



- 1.8 MW Standby Generator**
- Full interrupt capacity**
- Flexibility for utility power**



## ***ESCO Perspective***

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JOHNSON  
CONTROLS

***Selected as ESCO for project based on  
technical content in proposal for DOE Midwest  
Area Super-ESPC IDIQ Contract***



## ***Why Does JCI want to be Involved in ESPC?***

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- “Additional” Projects
  - Project would not be done without ESPC funding
- Large Projects
  - Development and Financing costs requires a larger project
- Long-term Customer Contact
  - Multi-year contracts with on-going M&V
- Requires “Value Added” Services
  - Johnson Controls expertise
  - Design/Development/Management

- **Energy Engineering**
  - **Extensive Database**
  - **Creativity**
  - **Ability to guarantee the savings**
  - **Understanding of FEMP Protocols**
  - **Interface with Government Support Agencies**
  - **Present information in IDIQ required format**

## o Sales

- **Patience (Long Sales Cycle)**
- **Work closely with project Facility Champion**
- **Establish contact with CO early in process**
- **Establish project criteria (term/service/political)**
- **Present / Confirm (repeat)**
- **Facilitate development schedule**
- **Communicate with “all” project team members**



- **Financial Strength**
  - **Development costs born by ESCO**
  - **Some projects will die**
  - **Ability to back the guaranteed savings**
  - **Financial Partners (large multi-year projects)**



# *Evaluating a Potential Project*

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- **Source of Funds**
  - **Utility Budget**
  - **O & M Budget**
  - **Funded Construction/Retrofit Project(s)**
- **Project Success Factors**
  - **How much can be saved from existing budgets**
  - **Large enough to fund the development costs**
  - **Major Impacts - Service/M&V Costs**
  - **Facility Champion**
  - **Criteria (term/service/interest rate)**



## ***Experience & Lessons Learned***

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- **Educated Facility Advocate**
- **Educated Administrative Support**
- **Plan an Approach to Financial Issues**
- **Identify & Plan for Indirect Benefits**
- **Adequate Technical Support**
- **Competent Contracting Support**
- **Plan for M&V Approaches**

- **Understand difference between ESPCs and Construction Contracts**
- **Tolerance for perceived and real risk**
- **Enthusiasm for trying something new**
- **Ability to coordinate efforts of diverse agency sections**
- **Continuous ‘Selling of the Concept’**



## ***Educated Facility Advocate***

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- **Time Commitment**
- **Understanding of ESPCs and dedication to energy reductions**
- **Vision for indirect benefits**
- **Technical training and government contract experience**
- **Budget for support needs**
- **Durability - Patience & Enthusiasm**





- \* Notification Signer
  - \* Financial Officer
- \* Area Engineer
- \* Procurement Review Team
- \* Adm Officer
  - \* Facilities Div. Chief

**-Now \$10 million Threshold**  
**-Time cost for delayed implementation**

- Prepare strategy on O&M savings before ESCO develops proposal
- Set limits/goals for term of contract
- No Immediate Reduction (energy bills)
- Prepare for administrative expectations
- Payment stream – can even utility costs

## ***Indirect Benefits***

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- Equipment Reliability
- Reduced O&M Costs
- Redistribution of O&M staff
- Reduced future capital expenditures
- Funding of capital projects with energy benefits that would not otherwise receive limited capital funds.

- Energy Engineering Required - Other disciplines a +
- DOE - FEMP support both training and PF
- Experience of Project Facilitator is important
  - **Approaches to M&V**
  - **Adequate time at critical milestones**



## ***Contracting Support***

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- Agency training and guidance a plus
- Written agency goals provide support
- Need adequate authority from CO
- CO will need to 'sell' to adm staff
- Support of Agency CO from a DOE CO is critical/beneficial for first delivery order



## ***Plan the Project Criteria***

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- Integrate ESPC scope with future site upgrades (planning)
- Critical Suppliers & Contractors
- Which ECMs to include? (Required vs. Acceptable)
- Site ECM Priorities and Ranking?
- Site Energy and Cost Savings Goals?
- Acceptable Contract Term
- Commissioning/Project Mgmt Plan



## ***Measurement & Verification***

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- **Confidence and Risk vs. stipulation/measurement of savings**
- **M&V Plan a MUST!**
- **Site should plan for how to handle**
  - **Proposal Review, Annual Verification**
  - **Maintenance of Records, Level of Skills and Training**
  - **Succession planning**



## ***Do's and Don'ts***

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### ***Do***

- **Consider all funding sources**
- **Evaluate project size and scope**
- **Establish financial criteria, but be flexible**
- **Select the correct ESCO**
- **Commit resources to the project (develop and sell)**
- **Remember this a performance-based project**
- **Be prepared to negotiate and compromise**

### ***Don't***

- **Lock-in on energy only**
- **Expect the ESCO to set the ground rules**
- **Set unrealistic financial requirements**
- **Overlook the special needs of ESPC**
- **Expect the ESCO to go it alone**
- **Treat an ESPC like a construction project**
- **Expect the ESCO to find a windfall of savings**